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NOTES ON EXPERIENCES

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DURING THE

Russo-Japanese Naval War

1904-5

Read before the Annual Meeting of the Association of
Military Surgeons, U. S. A.

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COLLEGE OF SURGEONS ENGLAND
17 OCT 05

By S. SUZUKI, *Surgeon-General*, Imperial Japanese Navy.

I feel it a great honour to be allowed to address this honourable meeting on the subject of my recent experiences during the present war. The limited space of time at my disposal does not allow me to go into details even on points of importance: and I think therefore that my best plan will be to touch briefly on the several points which have been most prominent in my experience, so as to give you at least an outline of the whole subject.

I divide my experiences as Surgeon-in-Chief of the Combined Fleets serving on board the Flagship "Mikasa" under Admiral Togo, into two parts.

(I). The Treatment and Management of the Wounded.

(II). The Sanitary Arrangements of the Combined Fleets.

And first, as to the

Treatment and Management of the Wounded.

In February of last year, before our fleets left Sasebo, I issued orders to the Surgeons of the fleets that aseptic treatment shall be adopted in the treatment of the wounded in all the battles of the war then imminent, and that all necessary preparations for the adoption of this treatment should be made. I also ordered the observation of conservative methods of surgery: amputations, etc., on board the warships should be avoided as far as possible, and every preparation made for transferring the wounded as soon as possible after the conclusion of an engagement to the hospital-ships, for conveyance to the home hospitals, where complete asepsis could be enforced and better results obtained than on the warships where our arrangements were of necessity more or less incomplete.

All the gentlemen here present are aware that even in peace time complete asepsis is a matter difficult of attainment on board a warship. During an engagement it is ten times more difficult. The firing of guns, the hasting to and fro of men engaged in combat, and a thousand other things fill the air around the temporary surgery with dust and particles of matter, a number of wounded cases are brought in, all demanding immediate treatment, and the constant need for despatch in doing our work—all combine to make complete asepsis a thing almost impossible to enforce. We are, however, convinced believers in the immense value of the aseptic treatment of recent wounds, so that we have constantly endeavoured to combat all the difficulties that stood in our way, and as I hope to show in this paper, our perseverance has been abundantly rewarded.

The total number of casualties from February, 1904, to August, 1905, was 3,682; of these 1,891 were killed, and 1,791 wounded, of which 117 died afterward.

Of the 1,891 deaths, 1,445 were due to shipwrecks caused by submarine mines, and only 563 to wounds received in actual fighting.

Of the 1,791 wounded, 647 received wounds requiring hospital-treatment, and of these only 32 died. The rest were partly light cases, and partly cases requiring greater care.

Our aseptic methods have been the same as those in general use in every part of the world. All dressing materials were sterilized by steam, and kept in close tin cases: surgical instruments were purified by boiling in soda water: the surgeon's hands, and the skin around the wounded parts, were washed in sterilized water, with soap applied by a brush. A solution of sublimate was next used, and this washing was followed by another washing with sterilized water. When the condition did not allow the use of soap and water un-hydrated alcohol was used to sterilize the skin around the wounds.

Many opinions have been broached by the surgeons of various navies as to the proper treatment of the wounded during the action. My own experience during the actions of present war leads me to the conclusion that it must be divided into two stages.

In the first stage, i. e., whilst the action is still going on, we can hope to accomplish nothing except the most urgent aid. We can merely ligature or compress arterial bleeding, or apply ready-made splints in cases of fracture, or cleanse the wounds of the soft parts of the body, and apply sterilized gauzes and bandages; but that is all. It is not till we come to the second stage, when the action is over and the firing has ceased, that we can really begin to apply our healing art. We can then get the ship's surgery ready for the work, and give orders for the wounded to be brought thither from the places where they have been temporarily bestowed. We take the severer cases first, examine the wounds minutely and make notes on each case. try to extract any fragments of shell or pieces of cloth which seem as if they could be got without much difficulty, and where possible suture the skin. It will perhaps be thought that in these latter cases, primary union is hopeless and that not much good can be obtained by suture. Our experience has, however, showed us that to cover a wound surface with skin is a great protection to it. In cases of compound fracture, free segments of bone in the wound cavity were extracted; but fissured fragments or such as were not completely detached were left *in sitû*, and it was found that these would unite afterward at the home hospitals. The dressings in the second stage were the same as those used in the first.

The treatment given during the second stage was merely of the nature of urgent aid. I believe that it is better to give temporary relief to the wounded rather than to meddle with complicated operations, and to transfer the patients as soon as possible to the hospital-ship. The action which has ceased for the time may at any moment be resumed. It is not right, therefore, nor desirable, to spend precious time in attending to the wants of a few, and thus to leave unattended the larger portion of the wounded. I believe that in crises like these it is a surgeon's duty to give relief to all the wounded and not to a few only.

The Location of the Temporary Surgery.

Many ideas have been broached in the various navies as to the proper place for a ship's surgery. Ideally speaking the right thing would be that at the time of designing a ship a proper space below the water-line should be allotted for the purpose with proper arrangements for the conveyance of wounded men; but this ideal arrangement often interferes with combatant dispositions, not only on smaller vessels, but even on battleships, and hence it has come to pass that not one of our men-of-war possesses a surgery ideally placed, though we found one or two on some of the captured Russian ships. My recent experience, however, confirms me in the thought that, in spite of certain drawbacks, the proper place for the surgery is below the water-line. Care must be taken to provide good light and good ventilation, and an elevator for the conveyance of the wounded is most desirable. It is not necessary that the sick-berths should be near the surgery: for the sick may be removed during the action to some place of greater safety; the berths may be placed in any suitable situation on a proper deck above the water-line.

The selection of a surgery for use during action is a point requiring the careful attention of the chief surgeon on each ship. The surgery ordinarily used is as a rule to be found on the main deck, but the position is too much exposed to be a safe one during an action. In battleships and armoured cruisers a suitable place may often be found on the lower deck, but this is still above the water-line: when we pursue our researches lower down in the ship, the difficulty is not so much to find a proper place as to provide convenient means for taking down the wounded. The ladders in the lower parts of a ship are generally too narrow and too steep to admit of a wounded man being taken below, except by an elevator, where there is one. In the engagements during the present war, our surgeries have as a rule been placed on the lower deck in battleships and armoured cruisers, whilst in the smaller cruisers either the wardroom, the cock-pit, or one of the larger cabins has been used for the purpose.

As to the number of ship's surgeries, every vessel from battleship to destroyer, should have at least two. The disastrous experience on board the "Hiyei" in the war with China in 1894-5 pointed us to this conclusion, and our experiences during the present war have confirmed us in this opinion. It will be urged in opposition to this that, in smaller ships which carry only one surgeon, it is impossible for him to use two places at once; but the second surgery is intended for use in case the first should be destroyed (as actually happened on board the"Hiyei"), and where such is the case the work of tending the wounded can be carried on without loss of time or expenditure of unnecessary labour. The use of the ordinary surgery at such times is fraught with danger, as the main deck is generally much exposed to the accidents of war. On the "Mikasa" the sick berths were damaged during the battle of the Yellow Sea last year, whilst the surgery was smashed by a shot during the battle of the Japan Sea last May. Had our surgical work during those battles been carried on in the ordinary surgery, both surgeons and patients would have been exposed to much danger.

In unprotected cruisers the sides of the surgery should be covered with canvas screens or mantlets. While the gunboat "Chokai" was engaged in assisting the operations of our land forces to the west of Port Arthur, a shell burst quite near to the cabin which was being used as a surgery, but the canvas screens prevented the entrance of any shell fragments into the surgery itself.

The following are the implements and instruments that should be provided in the temporary surgery:

Steam sterilizers, buckets for the reception of soiled materials, and ice boxes. An operating table may be improvised by the use of chests which are always to be found on board a ship. Wounded persons suffer much from thirst, and for this purpose jugs with long narrow spouts should be furnished. Tumblers or tubes for sucking are too inconvenient for use during action.

Receiving Place for the Wounded After First Aid.

It is important, but extremely difficult, to find a safe place for the bestowal of the wounded after their wounds have been dressed. On battleships and armoured cruisers we used the passages on either side of the lower desk, placing the sick on each side of the passage, with a narrow space left open down the middle; and in this way we found that we could provide for sixty or seventy men. When the wounded were in excess of this number, other places had to be found, and here we were confronted with a difficulty to which I have already alluded. The only places really suitable were far down below the water-line, accessible only by narrow and steep ladders which made the carrying of wounded men almost impossible, and devoid of light and proper ventilation. Fortunately in none of our engagements did the number of wounded men requiring treatment here exceed the limits of the space provided on the lower deck. The difficulty was therefore not an acute one, but we have learned a lesson which may be of use to us in the future.

In unprotected cruisers every part of the ship is practically alike exposed to danger, so that the placing of the wounded is not so difficult a problem. They were, as a rule, placed on the lower deck.

As soon as the battle is over, the wounded should at once be removed to the sick berths, or chest-flat, etc., and preparations be made for transferring them to the hospital ship.

During an action, nearly every hatch is closed, and the temperature on the lower deck rises very considerably not only in summer, but even in winter. This causes much distress to the patients, for whose use electric and other fans should be provided beforehand. On ships carrying ice-making machinery care should be taken to provide the lower deck with abundance of that article.

Dead bodies should be removed as speedily and as privately as possible, and placed in the temporary dead-house. For the bodies of officers we used the engineer's bathroom: the others were placed in the bathroom for seamen.

Carrying the Wounded.

It is the practice of the Japanese Navy during time of peace to divide the ship's complement into two portions for instruction in first aid and ambulance work.

The first division comprises clerks, riggers, servants, and fire brigade men (also the bandsmen on board the flagship), and receives instructions from the ship's surgeons, in bandaging wounds, prevention and stoppage of bleeding, and carrying of wounded men, for several hours per week. These men, therefore, are well qualified assistants in the work of tending the wounded with first aid. The second division consists of the rest of the crew, and receives instruction as time and opportunity allow.

We found, however, that in the bustle and excitement of an action it was impossible to put into practice all the rules and devices which our men had learned. In about one-third of the cases, first aid dressing was applied to the wounds, and the men carried down on stretchers to the surgery: in the remaining cases the men were just picked up as they fell and carried straight to the surgery in the arms of their comrades. In cases of slight injuries, however, the dressing was at once applied and the men went back to their stations without coming to the surgery at all.

It might perhaps be inferred from what I have just said that our ambulance work was not very satisfactory. But this was not the case. It is not to be expected that work of this nature should be carried out always "according to the book" in the thick of a close fight, where unforeseen accidents are continually happening to upset one's preconceived calculations. Let me instance a case. On the Flagship "Mikasa" we had ambulance parties with first-aid dressings stationed in several places on the upper and main decks, the intention being that whenever a man fell he should at once have his wounds dressed and be taken on a stretcher to the surgery. The "Mikasa," however, as being Admiral Togo's Flagship, was constantly in the very thick of the fight. In the battle of the Yellow Sea she was a target for many Russian guns, and seven ambulance men were killed and seven more wounded whilst engaged in the work of giving first aid dressing on the upper deck. After that experience it was considered unwise to risk any long exposure on the upper deck, and from that time the wounded were carried down to the surgery at once, without waiting to have their wounds dressed on the spot.

It was but natural that we should have some anxiety as to the after course of wounds brought exposed to the surgery, but I am glad to say that all such cases did well after admission to hospital. The wounded were often carried by two men, one at the head and one at the feet; but oftener still a single man would take his wounded comrade on his back. We Japanese are accustomed to this mode of conveyance, our babies are always carried about on the backs of their mothers, nurses and elder brothers and sisters.

Our experience has been that no one kind of stretcher is adapted for all the requirements of naval service, but this is a point on which I should like to invite your discussion later on. We had stretchers distributed in various places on the upper and main decks of our warships during action; but in many cases the stretchers were injured by fragments of shell, or buried beneath broken spars, etc., so as not to be readily accessible, or else the passages got so blocked with debris as to be impassable. We were thus frequently obliged to have recourse to carriage by hand.

Dressing Materials and Instruments.

A large consumption of dressing material is unavoidable during action. We foresaw this and provided each ship with a stock of material considerably larger than our usual annual ratio. Thanks to this precaution, none of our ships suffered from a deficiency of dressings, not even after the battle of the Japan Sea, when we had to treat many Russian wounded in addition to our own. For instance, 120 Russian prisoners were treated on board the "Kasuga" after the battle, and even with this large additional demand there was no shortage of supply.

Packets of first-aid dressing for the use of the Navy necessarily differ very much from those served to the Army. Gunshot or splinter wounds are usually much larger than those made by a small bore rifle bullet. To cover a gunshot wound completely we require two or three ordinary-sized packets of dressing, and it generally happens that when a man is struck by a bursting shell he has more than one wound. My experience after the fighting on the 9th of February last year showed me that much valuable time was lost in the mere opening of the small packages hitherto in use, and I consequently wrote at once to the headquarters to have the size altered. The packages hitherto served out to our Navy contained each three pieces of sublimate gauze folded to the size of three inches in length, and from 1½ to 2½ inches in width. This was inclosed within a folded piece of triangular bandage and the whole tightly packed in a small linen bag. There was no time on emergencies for the ambulance men to open and properly unfold these little packages, so as to cover the whole surface of the wound, and the consequence was that very often only a part of the wound was covered.

The new package contains four pieces of sublimate gauze, 24 inches long, and folded in a package 4 inches square. This package is wrapped in Japanese paper and is placed in a loose bag of "shibukami," a stout Japanese paper fabric steeped in the juice of the bitter persimmon, which also contains a regularly folded triangular bandage, and is tightly closed with sterilized paste. Our reports tell us that the new package is much easier to open, and that the larger size of the pieces of gauze materially facilitates the work of dressing. Packages of first aid dressing should be carried by all ambulance men besides being distributed in suitable places in the batteries, on the bridges, and elsewhere.

Each surgery should have a pair of large tailor's shears, these being very useful for cutting off the clothes of wounded men. Also a large number of dressed splints of different kinds and ready for use should be provided.

Fenestrated zinc plate splints are sometimes very useful. With them should be provided a pair of stout nippers for cutting them to the shape required. The aid of the blacksmith cannot be invoked for this purpose during the heat of an engagement.

Cotton rollers, 6 or 7 inches wide, are sometimes useful, and ought to be provided in every surgery. Also, for every surgeon and attendant there should be provided two or three changes of operating clothes, as the clothes worn during the action cannot be worn again for the operations during the second stage of treatment. India-rubber tubes, 4 or 5 feet long, carried by an ambulance party will sometimes save life by stopping bleeding from the limbs. We have had few instances of this during the present war. A transfusion-apparatus of salt solution will sometimes save from imminent death. We had one case of this on board the "Izumo."

Note should also be taken of the identification label. Every member of our force carries on his body a small wooden label, marked with his name and rank. This is of the greatest value to the surgeon in the identification of the dead. Bluejackets not unfrequently borrow clothes from their comrades, so that the marking of the clothes is no infallible guide, and it sometimes happens that the faces of the dead have been so disfigured as to be unrecognizable.

Protection of Persons.

It stands to reason that in preparing a ship for action everything should be removed except what is absolutely indispensable or useful for protection. Hammocks are very useful for protective purposes, but all metallic objects should be taken away wherever practicable. For instance, during the battle of the Yellow Sea, a semaphore in the fore part of the "Mikasa" was struck by a shell and 23 persons were either killed or wounded by splinters and fragments. If the semaphore had been removed—and it was not essentially necessary—this deplorable loss would not have been sustained. Bridges are always favourite targets for the enemy's gunners: they should be protected as much as possible by layers of hammocks hung over the sides. The compass-box on the topmost bridge is of vital importance and cannot be removed: it also should be incased in hammocks for protection, and the sides of light guns should likewise be covered with hammocks or mantlets. We have had many illustrations of the protective value of hammock screens: for we have frequently found embedded in them fragments of shell and splinters which would have wrought much havoc if it had not been for the screens. It might be thought that hammocks would be liable to be set on fire easily; but we have not had a single instance of this in the present war.

It should be noted that gun-crews, etc., on the non-firing side of the ship ought to be placed for rest on the *firing* side. This will perhaps seem strange, but a moment's consideration will show that the action of the fragments of a bursting shell is radiative, and that the area of destruction is far larger at a little distance from the place of explosion.

We found that hammocks could be used not only as protective screens but also as life-preservers. More than one occasion, when our ships sank after contact with Russian mines, the lives of our men were saved by clinging to their hammocks. A hammock makes an excellent life-buoy—it is not hard to touch, like wooden gear, and is easily handled.

When boats are sent out for rescue work in cold weather it is advisable to take a number of blankets for the use of the rescued persons. If this precaution is not taken there is the danger that some of the men may die from cold before reaching the ship. When there are many men to be picked up it sometimes takes a long time, especially in the dark, before the boat can get back to the ship.

In order to prevent burns or scalds from exploding powder or the steam from bursting pipes, every part of the body should be kept covered. We had many such accidents, but we found that in every case the men who observed this simple rule escaped with nothing more than injuries to face and hands. I gave orders that before the commencement of an action every one on board should put on clean underclothing.

I attribute much of the rapid progress to recovery made by our wounded to this precaution.

When steam is ejected from a bursting pipe, the men standing by should lie flat down on the platform or deck. Men who have tried to escape by climbing ladders or ropes have invariably been severely scalded.

It was once supposed that the conning-tower was the safest place on board a ship, but we can no longer believe that it is so. The observation-slits, though low, have to be made very wide, in order to secure a sufficient range of vision, and there have been several instances of shell-fragments finding their way into the towers through these slits, and inflicting severe injury on the inmates. One of the bridges, or even the compass-bridge, would seem to be a safer place for observation. Admiral Togo constantly used the compass-bridge of the "Mikasa" during action, both for observation and for directing the operations, and never received even the slightest wound.

We know that there are many instances in which a life has been saved by some object which the wounded man carried about his person, and which stopped the further progress of the bullet or shell fragment, and we have had several such instances in the present war. But we have also had instances of the opposite, where objects carried on the person have been driven into the body by the splinter and have thus aggravated the injury considerably. We had one instance of a captive Russian officer who carried in his breech pocket a number of gold coins which had all afterward to be extracted from his buttock.

We have received from our surgeons many reports as to rupture of tympanic membranes and concussion of the labyrinth during firing, and I am sorry to say that I do not yet know what is the best way to prevent these injuries, though I gave the matter my most careful attention. A remedy or preventive appliance which is to be used by several thousand men must not be of a complicated nature, and I could not think of anything more effective than plugging the meatus with cotton wool. During the period of preparation the surgeons and officers instructed the men of each division as to how to plug their ears, and sterilized cotton wool was distributed for the purpose not only to the gunners but to the whole crews, and yet both after the battle of the Yellow Sea and after that of the Japan Sea we had several cases of deafness brought to our surgeons. These cases may sometimes have been due to careless plugging of the ears, but there were some cases where the ears had been very carefully plugged, and yet deafness ensued. This will require further investigation.

The eyesight of gunners has a great influence on the results of a battle, in which accurate shooting is of such paramount importance. We have always carefully examined the eyes of our gunners before action. If we have found any eye-trouble we have treated it at once: if we have found that it was not easily curable we have had the man transferred to some other station, and his place has been taken by some man with unimpaired eyesight. We found that the gases and dust, which always accompany the firing of big guns, irritate the eyes of our gunners and impair their vision. Every battery has therefore been freely supplied with a one-per-cent solution of boracic acid for the use of the men.

Character of the Gunshot Wounds.

Wounds inflicted by shell fragments or splinters due to shell-explosions present the characteristics of laceration, whether in the soft tissues or in bony substances. The inlets of the fragments are generally smaller in size than the exits: sometimes, however, the exact opposite is the case, though it is hard for us to explain the causes of these and other phenomena. We have often found in the cavities of blind wounds with comparatively small inlets fragments of shell several times larger than the inlets themselves. In other cases we found wounds with only one orifice, in which we could find no fragments of shells or splinters lodging, though we searched for them carefully with Roentgen rays. And sometimes (as in post-mortem examination) we found fragments the presence of which in the body we could not account for at all.

In the mutilated wounds of the limbs the blood vessels had often been cut right across, and yet there were but few cases of profuse hemorrhage owing to the curling up and closing of the divided ends of the vessels.

In perforated and blind wounds fragments often pass quite close to the blood vessels without injuring them in any way. Arterial bleeding is therefore of comparatively rare occurrence in gunshot wounds, even though the wounds themselves may be large and in several parts of the body. When the shell fragments strike bones, the bones are generally fractured to pieces, but it sometimes happens that only the superficial layer is sliced off, or the bone merely fissured. Shell-fragments may be considered as aseptic, hence a wound caused by a small shell-fragment generally heals by primary union. Of this we had several instances in the present war. We found, however, that if a piece of cloth entered the wound along with the fragment of shell, there was always danger of the cloth being left behind when the shell-fragment was extracted, in which case suppuration was sure to follow. Whenever, therefore, the healing process is retarded by suppuration, a careful search should at once be made for the presence of foreign bodies such as pieces of cloth in the wound cavity. Once these are removed the wounds heal very quickly. The number of wounds inflicted on one person differs greatly; often they are more than one, sometimes they amount to several dozen or even over one hundred. The sizes of the wounds also differs greatly from mutilation of whole body to wounds as small as a millet seed. It is obvious, therefore, that in the naval battles the number of the wounds greatly exceeds that of the wounded persons.

There is no definite classification of gunshot wounds but we find the following list shows the character of the wounds fairly well.

Table of number of wounds classified (from the beginning of war to the battle of the Japan Sea):

Contusion	480
Abrasion	212
Incised and punctured wounds	26
Wounds with loss of soft tissues	53
Lacerated wounds	691
Blind wounds	224
Perforated wounds	113
Pulverized wounds	43
Mutilated wounds	129
Burns and scalds	129
Concussion of labyrinth; rupture and congestion of tympanic membranes	116
Compound fractures, simple fractures and dislocations	237
Explosive wounds	570
Asphyxia	25
Drowned	716
Total	3,764

(This table exceeds the actual number of killed and wounded persons, as one person often received several wounds.)

Location of the wounds in the killed and wounded:

Wounds of the head, face and neck	808
Wounds of the chest	157
Wounds of the abdomen	58

Wounds of the upper limbs	625
Wounds of the lower limbs	728
Wounds of the back, loin and buttock	189
Pulverization of whole body; burns and scalds of whole body	527
Asphyxia	25
Drowned	716
Total	3,833

(The number of wounds exceeds the number of killed and wounded as one person often received several wounds.)

Referring to the above table we see that contusions and lacerated wounds came highest: this may be a specific character of gunshot wounds. The great number of explosive wounds due to wounds inflicted at the time of sinking of the "Hatsuse" and the "Takasago."

Wounds of the Important Parts.

To illustrate some of the more interesting wounds of important parts the following short descriptions are appended:

1. T. K., boy of the "Tokiwa."—In the battle of Urusan on August 14th, 1904, a semilunar lacerated wound of 3.5 c.m. was inflicted on the antero-inferior angle of the left parietal bone. On admission to Sasebo hospital on the 15th he was apathetic but there was no motor or sensory disturbance; on the 18th sudden attack of nausea and fainting followed by general convulsions appeared.

   The wound was at once cut open, and the bone being fissured 3 c.m. and slightly depressed, the part was trephined and a blood clot of 3 or 4 c.m. in width and a half c.m. in thickness was found. On removing it blood oozed from the diploic vein; this was stopped by plugging; after the operation two or three slight convulsive attacks occurred but after that he made a good recovery and was discharged on October 17th.

2. J. W., signal man of the "Fuso."—He was wounded on the signal station of Namakoyama on November 30th, 1904. A lacerated wound on the left parieto-occipital suture and a hole of the size of a pea in the bone was present from which cerebral substance was escaping.

   On December 2d he was admitted to the hospital ship "Kôbemaru." At the time his mental power was confused but his speech clear and he complained of headache and shooting pain; there was no disturbance of sensation or motion, the hearing was clear but almost complete right hemiopia of both eyes was present. In the hospital ship depressed pieces of the bone were extracted and beneath the dura mater pieces of bone and blood clots were found which damaged the brain substance. On December 28th he was transferred to Sasebo Naval hospital. At his admission the wound on the head was nearly healed but the hemiopia was persistent, also headache and lightning pain toward occipito-temporal region was complained of. In the hospital eyesight recovered more or less but the course was tedious. He was transferred to Yokosuka Naval hospital on May 15th. 1905.

3. T. S., seaman of the "Nakhimoff."—He was wounded on May 27th, 1905, in the battle of the Japan Sea and captured. In front and above the left parietal protuberance and to one c.m. left to the sagittal suture a wound of 1.5 c.m. long was present which passed through the bone and reached to the brain. Reaction of the pupils were sluggish, the right lower limb was slightly movable but its action was greatly impeded, the action of the right upper limb was also lessened, urine was involuntarily discharged, knee jerks were lessened. The wound was cut open on the 29th soon after admission to Sasebo Naval hospital, where an inlet of about

1 c.m. in the bone was found and an irregularly rounded disc of bone was extracted. No shell fragment was found in the wound. After the operation the action of the right limbs returned gradually and on July 17th he was discharged completely cured.

4. R. Y., stoker of the "Mikasa."—Received the following wounds in the battle of the Yellow Sea on August 10th, 1904: Lacerated wound of the face with fracture of lower jaw; lacerated wound of the left eye; blind wound of the left thigh.

   The lower lip was torn off, and the upper and lower incisors were lost, there were fractures in both rami of the lower jaw, besides destruction of the left eye and numerous small explosive wounds were present in the chest and upper and lower limbs. He was operated upon in the following way:

   (1) The soft parts were separated from the body of the lower jaw and the fractured pieces were sutured with silver wire.

   (2) A skin flap was cut up from the right cheek and right wing of the nose and brought down to form a lower lip.

   (3) Adhesion of the upper lip to the left corner of mouth was separated and a semilunar incision was made in the left cheek, the right corner being cut open wide so as to obviate disfigurement of the lips. By means of the above operations and the application of false teeth the patient's powers of mastication and articulation were much assisted.

5. H. S., senior sub-lieutenant.—He was wounded on March 27th, 1904, on the "Mikawamaru" when second blockade of Port Arthur was being attempted. A large perforated wound on the left supraclavicular region, probably inflicted by the shell of a small-bore gun, was present, its inlet was nearly round, measuring 9.5 c.m. vertically and 7 c.m. transversely; the exit was oblong and smaller in size than the inlet, the two orifices being only separated by a flap of skin. A large wound cavity was formed and both the superficial and deep muscles on the left side of neck were destroyed; also, the apex of the left lung and the brachial plexus were more or less injured. He suffered from spitting of blood and emphysema around the wound though the progress of the wound was very good; but during the whole course he suffered constantly from hyperæsthesia, neuralgic pain, loss of power, and eruptions like herpes of the left upper limb. He left Sasebo hospital relieved on June 26th, 1904.

6. N. F., bugler of "Irtuish."—He was wounded on May 27th, 1905, in the battle of the Japan Sea—having a penetrating wound of the size of a 20-sen piece on the right side of sixth dorsal vertebral spine and passing deep into the spinal column. He had also a blind wound of the size of a pigeon's egg on the right shoulder. He suffered from hemiplegia and retention of urine, and died on June 9th of gradual exhaustion; at the post-mortem a fragment was found in the spinal cord by perforating through the right side of the base of the spine of the seventh dorsal vertebra; the cord above the injury was normal whilst the part below it had altered to a mud-like substance.

7. K. T., seaman of the "Iwate."—He was wounded on February 9th, 1904, in the battle off Port Arthur. A penetrating wound of the right axillary region and a perforating wound of the right arm were inflicted. At first fracture of rib and penetration of the thorax were suspected, but after the injuries spitting of blood, shortness of breath and dullness below the third intercostal space on the right side combined with moist rales on auscultation confirmed us in our suspicions. On February 27th the wound below the arm pit was opened wide and a fracture of sixth rib found; after removing the fractured ends a foreign body was searched for, but nothing was felt. Subsequently several examinations with Roentgen rays revealed the presence of a fragment in the part corresponding to the inferior angle of the

right scapula, after the resection of the eighth rib an iron fragment 1.7 c.m. dimension was extracted. After the operation the wound soon closed, but his chest was affected by burns from the Roentgen rays.

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Sanitary Arrangements During the War.

There is nothing special about the sanitation of a warship, either in peace or in war time; but it is to be observed that men-of-war during peace-time for the most part are stationed in naval and other ports, where provisioning is easy and abundant and the crews can get their regular turns at shore-leave. In war-time the ships are mostly cruising away from land: fresh provisions and supplies are obtained with less regularity, and the shore leave of the men is entirely stopped. Coaling at sea or at the base stations gives a constant succession of hard work to officers and men alike, and engineer-sections are never at rest, not even when the ship is at anchor. Steam must always be kept up in readiness for any sudden emergency, the watches are more than doubled, the labours of the crews are many times multiplied, and the hours of sleep and rest are reduced to the physiologically necessary minimum.

It is comparatively easy during war-time to prevent the introduction of infectious or venereal diseases; on the other hand, infectious diseases, if once they break out, are serious obstacles to the fighting efficiency of the crew. Our surgeons have throughout the war exercised great vigilanee, and, with the exception of an outbreak of dysentery, which put in a transient appearance before Port Arthur, we have been singularly free from all infectious maladies.

Rations.

Up to 1884, the men received a money-allowance instead of food, each ship had its own rations, and the crews were allowed to choose their own food, very much according to individual taste. This system encouraged the men in their fatal fondness for an over-proportionate amount of rice with their meals, and the disturbance of the physiological equilibrium caused thereby, led to a large and steadily increasing number annually of "Kakke" cases, which seriously interfered with the efficiency of the foree. A reform in the food supply became an absolute necessity, and in 1884 a new system was adopted by which rations of food took the place of a money-allowance. The reform was not carried out without serious opposition. Several minor alterations have been made since that time, but the principle has constantly been maintained of observing a balance of nitrogen and carbon in the food supplied so as to preserve undisturbed the physiological standard requisite for health.

The following statistics will, I think, be found of interest.

Health average for the last three years in ships of the Standing and other Squadrons:—

Total percentage of sick	3.87
Total percentage of men in bed	1.19
Total percentage admitted into hospital	0.66

Health average for 1904 in the Combined Fleets:—

Total percentage of sick	3.32
Total percentage of men in bed	0.72
Total percentage admitted into hospital	0.26

Health average for January to June, 1905, in the Combined Fleets:

Total percentage of sick	3.01
Total percentage in bed	0.65

I should observe that during war-times there are, of course, more cases of wounds and other injuries, but cases of venereal disease become less and less frequent. We paid much attention to this subject before the outbreak of the war, bringing the subject before our men by means of lectures, moral instructions and private exhortations. In spite of all our efforts a good many of the men went beyond the limits of prudence during the last few weeks of waiting at "Sasebo" previous to the declaration of war, and we started for Port Arthur with a comparatively long list of venereal cases which, however, speedily succumbed to the treatment they received on board. Since that time the men have been perforce kept out of the way of contamination.

The amounts of the rations given during this war were increased by 20 per cent for all the men following the ordinary dietary scales, but the quantity of rice supplied was kept absolutely below 12 ounces, and by the observance of this rule we managed to keep the health of the whole force in a good condition for the period of the long campaign.

Scale of Diet for the Crew.

Daily:—Biscuit 6 oz., or bread 8 oz., rice 12 oz., crushed barley 4 oz., preserved meat 5 oz., or fresh meat 7 oz., preserved or fresh fish 5 oz., dried vegetables 3 oz., or fresh vegetables 15 oz., tea-leaves ½ dram, roast barley 1 dram, sugar 6 drams.

Weekly (for cooking purposes) :—Peas or beans 2½ oz., wheat flour 2 oz., sugar 3½ oz., soy 3 oz., vinegar ½ oz., sesame oil 1 dram, salt 1½ oz., fat 1 oz.

Nightly (for supper) :—Biscuit 3½ oz., or bread 5 oz., tea ½ dram, sugar 4 drams.

Officers and warrant officers are allowed to receive money in lieu of rations. They are more careful in the choice of food and have more regard for the laws of health. An exception is also made in the case of torpedo-boat crews, who are likewise permitted to draw money in lieu of rations. The number of these men is, however, comparatively small, and they have frequent access to ports and small harbours where they can buy themselves supplies of fresh provisions. Both the officers and the men on board these boats are well aware of the importance of a regular and wholesome diet. They never fall into excess of any kind, and when bread is not to be procured, take a mixture of rice and crushed barley boiled together. The health of the torpedo-flotilla has been as excellent as that of the men on board the larger warships.

Supply of Provisions.

Our ships in peace-time obtain their supplies when in the naval ports from the victualling office, and when in other harbours from the agents. During the present war two victualling ships were fitted out for the sole use of the Combined Fleets. These ships were provided with cold storage arrangements for keeping meat and vegetables. Bullocks also were carried on board, and slaughtered as necessity required. The beasts were examined by veterinary surgeons at the victualling office before being shipped, and again on board, after being killed, by the ship's surgeon.

Our warships carry no baking ovens, the bread being sent to them by transports from the base. During the foggy season last year, the transports were frequently detained by fogs, so that the bread grew mouldy and many thousand pounds of it had to be thrown away. This experience taught us to overbake our bread, and in this way the danger of its going mouldy was obviated. At one time we thought that it would be necessary to organize baking ships for the supply of the fleets, but the scheme never materialized. The two victualling ships are sent home alternately to lay in fresh supplies, but whilst one is at home, transports are continually bringing fresh provisions which they transfer to the victualling ship remaining with the fleet. In this way we have always managed to have a good supply of provisions for our ships, and there has never been any shortage. Some of the cruisers, however, when on scouting duty have had to make out with biscuits and canned meats, as all fresh provisions were exhausted owing to their length of absence from the base.

Water Supply.

Ships which possessed evaporators used distilled water for all purposes, and the supply was in all cases sufficient. Destroyers, torpedo-boats, and special service vessels are as a rule supplied from water-supply ships. There are two water-supply ships fitted with distilling apparatus which can distil about 300 tons of water each per diem, and two water-transports of 5,000 tons together, besides colliers and transports which served as auxiliary water-carriers. The ships were thus kept well supplied with water not merely for drinking, cooking, but also for washing and bathing, for both of which liberal provision was made, frequent fresh-water baths being very good as preventives of boils, etc. Salt water baths were always provided for the crews after coaling, together with an allowance of fresh water for use after the bath.

Clothing.

For use in cold weather, the following additional articles of clothing were provided:

Officers and warrant officers—1 woolen muffler, 1 pair of thick woolen gloves, 1 woolen undervest, 1 extra overcoat.

For the men—2 pairs each of thick woolen gloves, long woolen stockings, and thick-soled Japanese socks, 1 woolen undervest, 2 pairs of flannel underdrawers, 1 pair boots, 1 extra overcoat, 1 pair of straw boots. The crews of torpedo-boats and destroyers had further five extra blankets per man. For use in hot weather, large brimmed straw hats were specially provided.

As a result of our precautions we note that frost-bites were almost unknown during the cold season throughout the fleet, and that at any rate no case of frost-bite was admitted to hospital. None of the men that wore the straw hats when working on deck during the hot weather suffered from sun-stroke, nor were any of the men in the engine room affected by heat-stroke in spite of the high temperature of that part of the ship. Our stokers were instructed to drink as little as possible. Their usual beverage was cool distilled water, but sometimes, as a treat, they were allowed water mixed with arrow-root and sugar.

War-Time Work.

During an engagement everybody on board a ship is working as hard as he can: but the hardest part of a seaman's work in war-time is coaling, an operation most laborious for officers as well as for men. During the blockade of Port Arthur our men had from 3 or 4 to 5 or 6 hours of coaling on the average twice every week while at sea, and sometimes also at the base station.

On board the smaller cruisers, destroyers, and torpedo-boats in close contact with Port Arthur during the blockade, or engaged in scouting work, the work was incessant. Ordinary routine work was almost entirely suspended, and when the men were not at work they were either eating or sleeping to make up for lost rest. In any case the life of a man-of-war is far more strenuous in war-time than in peace, yet the good health of our men under these trying conditions is shown by the following statistics of body weights based on the results of our half-yearly examinations:

	kan.		kan.
March, 1902	15.811	September, 1902	15.305
March, 1903	15.783	September, 1903	15.235
March, 1904	16.009	September, 1904	15.577
March, 1905	15.997		

The daily average total of the crews in the Combined Fleets is 23,506.

Recreation.

Life on board a man-of-war during a long expedition is always monotonous, and the men have no opportunities of going ashore. Our men have indeed been full of patriotism and have borne without a murmur all the hardships of their service; nevertheless we have felt that recreation in some form or other was necessary to their well-being.

Whenever opportunity has allowed the men have been encouraged to sing military songs, and to practice "Kenjutsu" (fencing), "Jiujutsu," and wrestling. Presents of various articles from home and abroad have given them great pleasure, and been a great incentive to renewed energy for their country's cause. Journals, papers and books sent by friends from every part of the world have been received with great joy; but the greatest of all pleasures have been the letters received from relatives and friends at home. Japanese ladies, and foreign ladies living in Japan, have been very active in works of benevolence for the men at the front, and this has been much more the case in the present war than it was in the China war ten years ago.

Hospital Ships.

In the present war we have had two specially fitted hospital ships, the sister vessels "Kobe-maru" and "Saikio-maru." They are ships of about 3,000 tons each, and each contains 186 beds, of which 18 are for infectious cases, and 12 for officers.

My idea at the beginning of the preparations was that it would be better to have two hospital ships of from 3,000 to 4,000 tons each, rather than one ship of larger dimensions. By having two ships we can make better provision for the speedy transference of our patients from the sick-berth of our warships to the wards of the base hospital where they can be treated with greater chances of success.

We have not attempted during the present war to transfer our patients by bringing the hospital-ship alongside of the man-of-war for that purpose. We have merely brought her somewhere near, and sent our patients across by steam launches or boats. We found that sick men's hammocks were the most convenient vehicles for transferring our patients from the ships to the boats.

The proper employment of hospital ships entails much thought and consideration from the Surgeon-in-Chief of the Fleets. Except at the battle of the Yellow Sea we had no need to send our wounded directly from the warships to the hospital ships. Our hospital ships were always stationed at the base during action: the Russians allowed theirs to accompany their squadrons, but unfortunately had but little opportunity of availing themselves of their services.

Infectious Diseases and Their Prevention.

The only infectious diseases which made their appearance on board our ships during the campaign have been enteric fever and dysentery. Cases of enteric fever will occur sporadically on war vessels even during peace-time. Typhoid fever showed no special increase during this period; whenever a case occurred the possible sources of entrance for the morbid germs were carefully investigated, but never with success. We are quite sure that the *virus* has in every case come from outside, and not been in the ship itself. We infer this from the fact that we have never had more than three or four cases occurring on any ship at any one time. The total number of typhoid cases from the beginning of the war to the end of June, 1905, has been 241. Whenever typhoid cases appear they are at once sent on board the hospital ships and everything in the way of bedding, clothes, etc., likely to have come in contact with the patient is thoroughly disinfected.

A few cases of dysentery broke out in the fleets during August and September of last year, while our ships were engaged in the blockade of Port Arthur. This outbreak caused us much anxiety for the time, but, thanks to the strenuous labours of our surgeons, the danger soon passed over. I believe that flies were responsible for the outbreak. These insects invaded the ships in enormous numbers whenever colliers or transports were brought alongside, and whenever boats were sent to inspect Chinese junks they invariably brought back clouds of flies with them. Everything was done on board our ships to exterminate the flies, and orders were given to have all food thoroughly well cooked before eating. In due time the dysentery disappeared. The total number of dysentery in the whole fleet amounted to 151 during the period ending June, 1905.

Wounded in the Japanese Fleets During Russo-Japanese War.

(From the Beginning to August 15th, 1905.)

Numbers / Battles and Dates	Killed	Wounded	Total	Termination of the Wounded			
				Deaths	Recovery	Invalided	Under Treatment
Attack upon Port Arthur (February 9th, 1904)	3	69	72	6	59	3	1
Battle of the Yellow Sea (August 10th, 1904)	65	161	226	6	133	17	5
Battle off Ulsan Bay (August 14th, 1904)	36	96	132	10	80	3	3
Naval Artillery Brigade at Port Arthur (From June 26 to last day of Dec.)	30	313	343	27	258	20	8
Battle in the Japan Sea (May 27th and 28th, 1905)	88	611	699	29	470		112
Other petty Battles and Accidents (1904-05)	1,669	541	2,210	39	470	30	2
TOTAL	1,891	1,791	3,682	117	1,470	73	131